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ABSTRACT

In 1989, a study was conducted within the Minnesota Community College System to determine the effects of a 3-year Writing Across the Curriculum (WAC) staff development program on the quality of student writing and on student mastery of course objectives. The study methods included faculty interviews, student and faculty surveys, holistic ratings of student compositions completed at the beginning and end of the fall 1987 and winter 1988 terms, and trait ratings of essay exams in four subject areas. Study findings included the following: (1) compositions collected at the end of the term received significantly better ratings than those collected at the beginning of the term, though factors other than WAC instruction could have contributed to the improvement; (2) a small but significant positive correlation was found between students' cumulative writing experience and the quality of their writing; (3) the study of grammar was of little or no benefit to the improvement of writing; (4) though no significant correlation existed, an emergent pattern suggested that WAC instruction may improve students' mastery of course objectives; and (5) students who had more writing experience in community colleges had a more positive attitude toward writing as well as better comprehension of subject material. Though findings suggested that WAC has promise for improving writing and content mastery, additional research is needed to confirm the results. (ALB)

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RESULTS OF INSTRUCTIONAL RESEARCH

IN A WRITING ACROSS THE CURRICULUM STAFF DEVELOPMENT PROGRAM

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RESULTS OF INSTRUCTIONAL RESEARCH IN A WRITING ACROSS THE CURRICULUM STAFF DEVELOPMENT PROGRAM

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Minnesota Community College System

Faculty interviews, student and faculty surveys, holistic ratings of student compositions, and trait ratings of essay exams in four subject areas were conducted by a three-year evaluation project to obtain information about the effects of a Writing Across the Curriculum ("WAC") program in the Minnesota Community College System. This paper will present a brief overview of the project, followed by results of the instructional research conducted to assess the effects of WAC on the quality of student writing and on student mastery of course objectives.

OVERVIEW OF THE WAC PROGRAM AND WAC EVALUATION PROJECT

A three-year Writing Across the Curriculum (WAC) staff development program was funded by the Bush Foundation to give faculty in the Minnesota Community College System the skills and motivation necessary to use instructional writing in all subject areas. The program involved a four-day summer conference, a one-day spring Reunion Conference, plus follow-up meetings and other activities organized by a Systemwide WAC Coordinator and the WAC Coordinators for each of the 18 community colleges. WAC Coordinators attended two leadership training workshops to develop the skills necessary to build strong, ongoing college programs.

Program Goals: An accompanying WAC Evaluation Project, also funded by the Bush Foundation, was designed to assess the effectiveness of WAC in achieving the program's seven goals:

1) To organize WAC workshops and follow-up activities which give community college faculty the skills and motivation to implement writing activities effectively in the courses they teach;
2) To improve faculty attitudes towards the use of writing in instruction;
3) To increase the amount and types of writing students experience across the curriculum;
4) To obtain diagnostic information which will enable faculty to be more effective in their use of writing activities;
5) To improve student attitudes towards writing;
6) To increase the quality of student writing in courses taught by WAC faculty;
7) To increase student attainment of subject goals in courses taught by WAC faculty.

Program Evaluation Methodology: A variety of methods requiring a high degree of faculty participation was used in collecting information to assess the attainment of program goals. Interview scripts, a student essay question and scoring guide, and subject experiments were developed, pilot-tested, revised, administered, and scored by faculty who were trained to do so. The Evaluation Coordinator worked closely with the System WAC Coordinator in constructing faculty and student surveys to ensure that they were relevant to program needs and interests. All WAC participants were asked to complete several faculty surveys. In addition, a stratified random sample of 34 professors - some WAC and some non-WAC - administered student essays, and 40 other professors administered student surveys in one or more of their classes. Thus, each of these represents a component of the evaluation project which required its own planning, organization, and coordination with program personnel. All instruments were pilot-tested prior to actual use.

Instructional Research Components: Assessment of the impact of the WAC program on student learning was of greatest interest to the sponsoring agency. The Bush Foundation has been giving money for staff development programs to Midwest educational institutions on the assumption that the benefits of staff development will "trickle down" to students. Since faculty interviews as well as surveys from students and faculty provided evidence that WAC activities sparked enthusiasm (goals #1 and 2) and affected classroom practice by resulting in an increase in the amount, variety, and perceived effectiveness of instructional writing used by WAC faculty (goals #3 and 4), it was possible to carry the evaluation project a step further by examining the effects of these changes in instruction on students (goals #6 and #7). Data were also gathered on student attitudes (goal #5).

Two types of instructional research studies were conducted as part of the evaluation project. 1) Composition Experiment: A Systemwide study was implemented to identify the effects of instructional writing on the quality of student writing as reflected by their performance on a composition question. 2) Subject Experiments: Experiments in biology, business, philosophy, and English were implemented by individual faculty to identify the effects of instructional writing on students' learning of subject matter as reflected by their performance on essay exams in those subjects. Together, these studies provide an indication of the potential of WAC programs to achieve their instructional goals. A more detailed description of each is given below.

COMPOSITION EXPERIMENT TO ASSESS THE QUALITY OF STUDENT WRITING

An underlying assumption of the WAC program is that, by having students experience more writing and more types of writing in a greater variety of disciplines, the quality of student writing will improve. Students who have more practice with writing, and who are asked to apply principles of good writing in different contexts and for different purposes, should be likely to be more proficient writers than those whose experiences are restricted to composition classes.

Method: To test this assumption, a 50-minute essay exam was administered to 1,085 students in 48 classes across the System. The classes were selected from all 18 colleges as a random sample stratified by college and subject area, drawn from non-WAC as well as WAC faculty. Approximately 400 of these were "baseline" essays collected in introductory courses at the beginning of fall term, 1987. The others were "post-instruction" essays collected from different students - some from the end of fall term, 1987, and others from the end of winter term, 1988. The compositions were "blind" rated for quality of writing by trained raters using a holistic scoring method. For a detailed description of holistic rating procedures see White (1985); also White (1989).

An examination of inter-rater reliability of essay ratings indicates that some raters were "easier," and some were "harder" than others - that is, they gave ratings consistently above or below those given by other raters. However, since each essay was scored at least twice by different raters, these individual biases balanced each other, and the odds were greatly in favor of valid total ratings for each composition.

Data were analyzed to see whether students who had more instructional writing (as indicated by the number of classes they completed with WAC-trained professors, plus the number of composition classes taken by non-WAC as well as by WAC professors) received higher ratings on their compositions than students with less instructional writing experience. Additional analysis was done to compare post-instruction and baseline essay ratings; to see whether a class in which exemplary applications of WAC principles were used received higher essay ratings than others; and to identify any effects on writing of grammar instruction and the use of word processors.

Results of End-of-Term Versus Baseline Essays: Compositions which were collected at the end of term received significantly higher ratings than the baseline essays which were collected at the beginning of fall term. The mean essay rating for baseline essays was 6.33, and the mean for end-of-term was 6.96. The t-test for the difference (898.6 df) was -4.56, significant at $p = 0.0001$. The t-test indicates ($p = .0001$) that the quality of student writing improves over a period of one or more terms at a

community college. One can not be sure that it was instructional writing rather than other possible factors (e.g. other types of instruction, maturation, motivation from being in a college setting over time, etc.) which was responsible for this improvement. However, instructional writing was used in most of the classes in which essays were collected, and the change observed is consistent with the hypothesis that end-of-term scores would be higher.

Results of Cumulative Instructional Writing Experience: Since skill in writing may develop more slowly than is observable in the period of a 10-week term, historical data were collected to identify the impact of instructional writing experienced from the time of admission to the community college. A small but positive and statistically significant correlation was found between students' cumulative writing experience (as reflected by this historical measure) and the quality of their writing as measured by their composition scores. The historical measure, also known as the "WAC'iness" rating, was defined for each student as the sum of the number of classes he or she completed from WAC-trained professors plus the number of all (including non-WAC) composition classes taken. The Pearson correlation coefficient for 1,045 cases was .066, significant at the .03 level of probability.

No significant correlation was found between writing quality and number of non-WAC composition courses taken. However, this latter variable suffered from low variance, and the absence of correlation may be spurious. The total number of classes taken overall ("community college experience") was positively correlated with essay ratings (the Pearson coefficient was 0.083, with $p < .007$). A partial correlation was calculated to identify the effects of WAC'iness ratings when controlled for total numbers of classes. The result, $r = 0.0254$, was not significant.

Results of Exemplary Application Case Study: Bamburg (1979) indicates that increasing the amount of writing students do in itself will not improve the quality of their writing, and that some applications of writing, such as "free writing" for some purposes, may even have negative effects. For this reason, a Minnesota Community College class was selected to examine the impact of instructional writing under hypothesized "best case" conditions.

A professor new to the System designed his history and political science classes "from scratch" according to the advice offered in WAC workshops and materials. The 10-week political science class of his which was in the essay collection sample was used as a case study to see whether an exemplary application of WAC principles would result in higher composition scores. This was a regular class, and neither the professor nor the students knew that they would be selected for case study analysis until after the course had been completed.

This exemplar class obtained the highest mean rating of the 48 involved in the study. A t-test confirmed the difference between this and the other classes. The exemplar class mean was 8.24; the mean of all other participants was 6.87. The t statistic was 2.70 (512 df), significant at p =0.0071. These findings suggest that the principles advocated by the WAC program are appropriate and that instructional writing which is implemented in accordance with these principles has the potential to enhance the quality of student writing.

Findings Relating to the Use of Grammar Instruction and of Word Processing in the Teaching of Composition: Secondary analysis was conducted on data collected for the Systemwide composition experiment described above to examine the essay ratings from one class in which composition was taught through grammar instruction and from four other classes in which composition was taught through the use of word processors. Results were consistent with previous research:

1) One of the strongest findings in the literature on the effectiveness of various instructional procedures in improving writing is that grammar study is of little or no benefit (Braddock, Lloyd-Jones and Schoer, 1963; Hillocks, 1986). An over-emphasis on grammatical correctness in grading may even interfere with the development of writing competence (Adams, 1971). For this reason, it was hypothesized that a class which was taught by a WAC-trained professor but which used grammar study instead of instructional writing to teach composition would receive lower student essay ratings than average in the composition experiment on the quality of student writing. Results of a t-test ($t= -2.04$, $df=512$, $p=0.0416$) confirmed the hypothesis.

2) To investigate the effects of word processors on the quality of student writing, essay ratings were compared using two classes in which word processors were used, versus two regular classes. In this study, one WAC-trained professor and one non-WAC professor each had one section of a composition course in which students used word processors and one section in which they did not. The same final essay exam was given to all four sections (two experimental and two control). Essays from the control classes were re-typed on a word processor after collection so that holistic raters would not know which exams came from which classes. In both cases, t-tests revealed that essay ratings for the word processing classes were slightly but not significantly lower than ratings for the regular classes. (In the first study, $t=0.28$, $df=43$, and $p=0.78$; in the second, $t=1.18$, $df=42$, and $p=0.24$). These results reinforce conclusions reached in most earlier studies that student writing does not improve with the use of a word processor (McAllister and Louth, 1988; Harris, 1987; Hawisher, 1986).

SUBJECT EXPERIMENTS TO ASSESS STUDENT MASTERY OF COURSE OBJECTIVES

Another assumption of WAC is that instructional writing will help students to process information, thereby improving their understanding and retention of course content (Fulwiler, 1985; also Myers, 1985). Survey results from the evaluation project indicate that over 90% of both faculty and students believe that instructional writing assists the learning of subject matter. Professors' interest in WAC may be based on this belief.

Method: Six quasi-experimental studies in four subjects - biology, business, language arts and philosophy - were conducted to test the effects of instructional writing on student attainment of subject objectives. The experiments were conducted by faculty who received training in designing and implementing the experiments. Instructional writing was used in the experimental sections of these courses, and alternative instruction was used in control sections. Experimental and control classes were comparable in their course content and student characteristics.

An essay exam, business letter, or some other exam involving subjective judgment was collected from students in both sections in five of six of the experiments - the sixth used an objective test. The subjective exams were "blind rated" by additional faculty from the same four subject areas who were trained as trait raters and who constructed scoring guides which addressed specific course objectives. Data from each experiment were analyzed to see whether the students in the instructional writing sections achieved higher ratings on their subject essay or objective exam than students who received another type of instruction.

Findings: In five of the six studies, the experimental class obtained slightly higher mean scores on their exams than did the control class. (See Table 1: "Results of WAC Subject Experiments.") Since t-tests indicate that none of the differences in means was statistically significant, these studies when considered individually do not provide convincing evidence that writing improves student learning of subject matter. However, outcomes of the experiments together constitute what may be an emergent pattern. The probability of seeing five pro-experimental differences in six trials by chance alone is 11%. More subject experiments are needed to see whether other outcomes reinforce or negate this pattern of results.

STUDENT ATTITUDES TOWARDS WRITING

Analysis of end-of-project student survey data using the Chi-Square statistic indicates that students who have had more writing experience in their community college also have more positive attitudes towards writing (see Tables 2-5). Those student respondents who reported having a lot of writing in most of their classes agreed or strongly agreed that writing helps them to learn subject material. In addition, significantly larger percentages of those who have had more instructional writing agree that they enjoy writing or that it gives them a sense of satisfaction; that writing assignments are preparing them for their chosen occupation; and that writing is important in their personal life.

An unexpected result of our analysis was the discovery that students have more positive attitudes towards writing than faculty seem to think. As shown in Table 6 ("Student Attitudes Towards Writing"), students give higher ratings to their own enjoyment of writing than faculty give in assessing their students' enjoyment of writing.

DISCUSSION AND IMPLICATIONS FOR FURTHER STUDY

Instructional research designed to identify the effects of instructional writing on student writing proficiency and subject learning were promising in both areas. However, further research is needed to substantiate these findings. The pattern of results observed in the subject experiments was suggestive, though not statistically significant, and will therefore require additional studies for confirmation. Implications of the composition experiment need clarification, since although they were of statistical significance, the results were tenuous and somewhat ambiguous.

Possible Faculty Variables: Composition experiment correlations were so small that they may be explained by faculty variables. Since professors who participate in the WAC program do so on a voluntary basis, it may be that they are "better teachers" than non-WAC professors. If so, it may be that it is better teaching in a general sense, rather than the specific use of instructional writing, which has a positive effect on the quality of student essays.

Total Number of Classes: Even if the composition results are not due to better teaching by WAC faculty, the impact of instructional writing as distinct from total number of classes taken remains unclear. It is possible that it is not instructional writing, but rather some other aspect or aspects of classroom experience that results in improved student writing.

stimulation of additional classes are of greater importance. On the other hand, it may be that instructional writing is, indeed, the key factor, but that the effects of the WAC'iness ratings are clouded because students experience a substantial amount of writing in classes taught by non-WAC faculty. If so, WAC'iness ratings may be too imprecise to serve as a good measure of writing experience.

Student Variables: Another possibility is that students who take more courses are better motivated and have greater academic aptitude than those who complete fewer courses. If so, such student characteristics could account for the correlation between essay ratings, number of WAC classes and total number of classes.

Instructional Design: Given the relative clarity of results for the exemplary application case study and findings from previous research, it is perhaps most likely that instructional writing can be expected to be effective only when applied according to certain principles and under certain conditions - that whether writing is used is not as important as the ways in which it is used for subject learning as well as for writing proficiency. Studies suggest that some kinds of writing instruction may have a negative effect on student compositions (Bamburg, 1979); and that although notetaking and summary writing can promote subject learning (Kulhavy, Dyer, and Silver, 1975; Spurlin, Dansereau, Larson, and Brooks, 1984), writing which requires analysis and evaluation is more beneficial (Newall, 1984; Durst, 1987). Thus, for subject experiments as well as for the composition experiment, a potential for positive results may be diminished through the the amount and types of writing used by different professors, and from an unevenness in the quality of the design and implementation of instructional writing activities.

Further Research: Another three-year grant was received by the Minnesota Community College System from the Bush Foundation to institutionalize the programs and continue the evaluation project. During this period, secondary analysis will be performed to identify the effects of the competing variables discussed above. A more intensive longitudinal composition experiment will be conducted in three Greater Minnesota colleges, in which pre-test and post-test essays will be collected from the same students. Additional subject experiments are also anticipated.

CONCLUSION

In combination, findings from the WAC evaluation project provide evidence that, if instructional activities are well-designed, more experience with writing in courses across the curriculum can help students to become better writers. More research is needed to determine whether instructional writing, per se, is effective, and what intervening variables might enhance or impede outcomes. Principles of good instructional design promulgated by the WAC program are supported by our results, but need further exploration. Outcomes of individual classroom experiments on the effects of instructional writing on the learning of subject matter are promising but are not statistically significant. Additional experiments must be conducted to confirm or deny the existence of an emergent pattern of gains which may not register statistical significance due to the small numbers of students and short period of treatment (ten weeks) involved.

TABLE 1

RESULTS OF WAC SUBJECT EXPERIMENTS

EXPERIMENTS	EXPERIMENTAL GROUP MEAN	CONTROL GROUP MEAN	t-STAT-ISTIC	df	"P" VALUE (LEVEL OF SIGNIFICANCE)
Biology 1	7.68	6.62	-1.30	54	.20
Biology 2	10.54	9.37	-.79	25	.44
English	8.75	7.65	-1.49	27	.15
Philosophy	25.76	25.14	-0.37	41	.72
Business 1	7.22	6.42	-0.92	32.3	.37
Business 2	6.90	7.29	.68	59	.50

TABLE 2

STUDENT EXPERIENCE AND ATTITUDES TOWARD WRITING. (RECODED)

TABLE OF S1Q1 BY S6Q1

S1Q1 WRITING DONE IN CC CLASSES. S6Q1 WRITING HELPS ME LEARN SUBJ MATTER.

FREQUENCY EXPECTED ROW PCT COL PCT		AGREE	UNCERTAIN	DISAGREE	TOTAL
	0	4	0	0	.
	.	.	.	.	
	.	.	.	.	
	.	.	.	.	
NO/VERY LITTLE	7	50	4	3	57
	.	52.3	3.2	1.5	
	.	87.72	7.02	5.26	
	.	15.92	21.05	33.33	
FAIR AMOUNT OF WR	3	169	10	2	181
	.	166.2	10.1	4.8	
	.	93.37	5.52	1.10	
	.	53.82	52.63	22.22	
GREAT DEAL OF WR	1	73	5	4	82
	.	75.3	4.6	2.2	
	.	89.02	6.10	4.88	
	.	23.25	26.32	44.44	
LOTS OF WRITING	1	22	0	0	22
	.	20.2	1.2	0.6	
	.	100.00	0.00	0.00	
	.	7.01	0.00	0.00	
TOTAL	.	314	19	9	342

CHI-SQUARE 7.122 DF= 6 PROB=0.3098

TABLE 3

STUDENT EXPERIENCE AND ATTITUDES TOWARD WRITING. (RECODED)

TABLE OF S1Q1 BY S1Q3

S1Q1 WRITING DONE IN CC CLASSES. S1Q3 ATTITUDE TOWARDS WRITING.

FREQUENCY EXPECTED ROW PCT COL PCT	1 ENJOY/ACCOMPLISH	2 DON'T MIND WRITI	3 NEVER LIKE/AVOID	TOTAL
	3	0	1	0	.
	.	.	.	.	
	.	.	.	.	
	.	.	.	.	
NO/VERY LITTLE	0	32	19	13	64
	.	36.1	19.8	8.2	
	.	50.00	29.69	20.31	
	.	16.08	17.43	28.89	
FAIR AMOUNT OF W	0	98	64	22	184
	.	103.7	56.8	23.5	
	.	53.26	34.78	11.96	
	.	49.25	58.72	48.89	
GREAT DEAL OF WR	0	52	22	9	83
	.	46.8	25.6	10.6	
	.	62.65	26.51	10.84	
	.	26.13	20.18	20.00	
LOTS OF WRITING	1	17	4	1	22
	.	12.4	6.8	2.8	
	.	77.27	18.18	4.55	
	.	8.54	3.67	2.22	
TOTAL	.	199	109	45	353

CHI-SQUARE 10.023 DF= 6 PROB=0.1237

TABLE 4

STUDENT EXPERIENCE AND ATTITUDES TOWARD WRITING. (RECODED)

TABLE OF S1Q1 BY S6Q12

S1Q1 WRITING DONE IN CC CLASSES. S6Q12 WRITING ASSGTS PREPARE ME FOR OCCUP.

FREQUENCY EXPECTED ROW PCT COL PCT		AGREE	UNCERTAIN	DISAGREE	TOTAL
	0	1	3	0	.
	.	.	.	.	
	.	.	.	.	
	.	.	.	.	
NO/VERY LITTLE	7	21	11	25	57
	.	23.8	17.9	15.3	
	.	36.84	19.30	43.86	
	.	14.79	10.28	27.47	
FAIR AMOUNT OF W	5	72	63	44	179
	.	74.8	56.3	47.9	
	.	40.22	35.20	24.58	
	.	50.70	58.88	48.35	
GREAT DEAL OF WR	1	36	27	19	82
	.	34.2	25.8	21.9	
	.	43.90	32.93	23.17	
	.	25.35	25.23	20.88	
LOTS OF WRITING	1	13	6	3	22
	.	9.2	6.9	5.9	
	.	59.09	27.27	13.64	
	.	9.15	5.61	3.30	
TOTAL	.	142	107	91	340

CHI-SQUARE 14.110 DF= 6 PROB=0.0284

TABLE 5

STUDENT EXPERIENCE AND ATTITUDES TOWARD WRITING. (RECODED)

TABLE OF S1Q1 BY S6Q13

S1Q1 WRITING DONE IN CC CLASSES. S6Q13 WRITING IS IMPORTANT FOR PERSONAL LIFE.

FREQUENCY EXPECTED ROW PCT COL PCT		AGREE	UNCERTAIN	DISAGREE	TOTAL
	0	2	1	1	.
	.	.	.	.	
	.	.	.	.	
	.	.	.	.	
NO/VERY LITTLE	7	16	17	24	57
	.	24.9	16.9	15.2	
	.	28.07	29.82	42.11	
	.	10.74	16.83	26.37	
FAIR AMOUNT OF W	4	80	56	44	180
	.	78.7	53.3	48.0	
	.	44.44	31.11	24.44	
	.	53.69	55.45	48.35	
GREAT DEAL OF WR	1	39	21	22	82
	.	35.8	24.3	21.9	
	.	47.56	25.61	26.83	
	.	26.17	20.79	24.18	
LOTS OF WRITING	1	14	7	1	22
	.	9.6	6.5	5.9	
	.	63.64	31.82	4.55	
	.	9.40	6.93	1.10	
TOTAL	.	149	101	91	341

CHI-SQUARE 15.567 DF= 6 PROB=0.0163

TABLE 6

STUDENT ATTITUDES TOWARDS WRITING

	WAC Faculty Perception of Student Attitudes*		Student Self-Ratings**	
	#	%	#	%
ENJOY WRITING	9	8.2	233	23.5
SENSE OF ACCOMP-LISHMENT	54	49.1	318	32.0
DON'T MIND WRITING	37	33.6	299	30.1
ALMOST NEVER LIKE	7	6.4	110	11.1
DON'T USE INSTRUC-TIONAL WRITING	3	2.7	---	---
AVOID TAKING CLASSES WITH WRITING	---	---	33	3.3
		100.0		100.0

*The question WAC-trained faculty were responding to was, "Which statement best describes your students' attitude towards writing?"

**The corresponding question for students was, "Which statement best describes your attitude towards writing?"

TABLE 7

RESULTS OF WAC EXPERIMENT RELATING TO THE USE OF GRAMMAR INSTRUCTION IN THE TEACHING OF COMPOSITION

MEAN OF ESSAYS FROM GRAMMAR CLASS	MEAN OF ALL STUDENT ESSAYS	t-STAT-ISTIC	df	"P" VALUE (LEVEL OF SIGNIFICANCE)
5.82	6.97	-2.04	512	0.04

TABLE 8

RESULTS OF WAC EXPERIMENTS RELATING TO THE USE OF WORD PROCESSORS IN THE TEACHING OF COMPOSITION

	MEAN OF ESSAYS FROM WORD PRO-CESSING CLASS	MEAN OF ESSAYS FROM REGULAR CLASS	t-STAT-ISTIC	df	"P" VALUE (LEVEL OF SIGNIFICANCE)
Experiment 1:	6.81	7.00	- 0.28	43	0.78
Experiment 2:	6.78	7.57	- 1.18	42	0.24

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